Report from a Team for the elaboration of a concept for polish orbital resources management

I. Introduction

25 November 2003, the President of the Office of Telecommunications and Post Regulation (URTiP) established a Team for the elaboration of a concept for Polish orbital resources management, consisting of:

Chairman:

- Józef Modelski – Head of the Telecommunications Council, Director of Institute of Radioelectronics, Warsaw University of Technology

Members:

- Jerzy Czajkowski – Director of International Department, URTiP
- Andrzej Dąbrowski – Director of Institute of Telecommunications, Warsaw University of Technology
- Wiesław Dzierżak – Director of Centre for Satellite Services, Telekomunikacja Polska S.A.
- Zbigniew Kłos – Director of Centre for Space Research, Polish Academy of Science
- Jacek Łosik – Departmental Director, Ministry of Infrastructure
- Tomasz Niewodniczański – Director of Frequency Resources Managment Department, URTiP
- Krzysztof Surgowt – President of "ASTRA Polska"
- Tadeusz Więckowski – Vice-President of Wrocław University of Technology

The following non-voting experts also participated in the Team's discussions:

- Romuald Gajczyk – Head of Satellite Division, URTiP
- Zenon Krawczyk - Member of POLSPACE Sp. z o.o Board

Several studies have been prepared for the purposes of the team (Annex 1, Annex 2) and the team used materials drafted by the European Commission and the Committee for Space and Satellite Research of the Polish Academy of Science (Annex 3).

II. Orbital positions granted to Poland under international treaties

Poland as a Member State of International Telecommunication Union (ITU) under decisions of World Radiocommunication Conferences (WARC-1985, WARC-1988,

WRC-2000, WRC- 2003), obtained the right to use two positions in the geostationary orbit:

- Position for a telecommunications satellite – **15.2ºE**, specified in Appendix No 30B of Radio Regulations. The allotment comprises: a nominal orbital position, frequency bands and bandwidths, a service area for national coverage, generalised parameters and a predetermined arc (PDA).
- Position for a broadcasting satellite – **50ºE**, specified in Appendix No 30 and 30A of Radio Regulations. This position is shared with the following countries: Afghanistan, Sri Lanka, Iraq, Kirghistan, Moldova, Nepal, Turkmenistan, Romania. The assignment comprises: channel numbers and assigned broadcasting frequencies, orbital position description, boresight geographical coordinates, satellite station antenna characteristics, its gain and equivalent isotropically radiated power (e.i.r.p.).

Detailed data describing the above-mentioned positions can be found in Appendix No 30, 30A and 30B of Radio Regulations. However, their short description is included in materials prepared for the team by the Department of Frequency Resources Management as Annex 1 to this paper. (Legal aspects of Polish orbital resources management and assessment of their usefulness, R. Gajczyk, URTiP Department of Frequency Resources Management, November 2004).

III. World trends in development of satellite communications

Currently there are over 500 GEO geostationary satellites in the orbit and over 100 LEO satellites in low orbits, which ensure two-way transmissions (telephony, fax, digital data) and broadcasting of television and radio programmes It is economically viable to build earth systems for broadband multimedia services based on DSL (Digital Subscriber Line), HFC (Hybrid Fibre Coaxial) and LMDS (Local Multipoint Distribution System) in densely populated areas with well developed telecommunications infrastructure. For the remaining areas the option seems to be satellite systems. The use of satellites in the geostationary orbit ensures global coverage for offered services with equal conditions of reception in the whole of a covered area including remote and scarcely populated ones with no earth telecommunications network. Big capacity of a satellite ensures simultaneous access to the system for numerous earth stations, frequently located within large distance.

Currently the development of satellite communications system is linked with three segments of the service market:

- broadcasting of television and radio programmes
- services for mobile users
- broadband transmission of multimedia data

The satellite in the geostationary GEO orbit is ideally suited for broadcasting services and further growth in the number of offered TV programmes is expected (the development of HDTV in Europe, programmes on demand). Currently broadcasting

stands for more than 60 per cent of all transmissions within satellite systems and constitutes the fastest developing segment of satellite services market.

In response to a trend to provide users of communications systems with full mobility so that they can use the system independently of their location and the existing earth infrastructure, mobile satellite communications systems are gaining in importance. In this case satellite systems complement earth systems, ensuring communications with vessels at sea, planes at high altitudes or with users in areas with no earth telecommunications infrastructure.

It is expected that over the next few years or so the growth in demand for broadband services will be one of the crucial drivers for the development of satellite communications with institutional users (international corporations) as the main group. Broadband satellite systems are to complement earth systems (fibre-optic and radio ones), providing users with services in areas with no earth networks. The conditions for new systems to be successful comprise: matching users' demand, availability of inexpensive terminals and competitive prices as compared to earth systems which offer similar services.

A few years ago it seemed that the systems using satellites in low orbits (LEO) and medium orbits (MEO) were a solution to many problems with satellite systems in the GEO orbit (limited space in the orbit, big attenuation and signal delay). However, the application of satellites in such orbits (LEO and MEO) requires the use of a constellation of many satellites in order to ensure continuous work and global coverage, which results in increased costs of the system's design, construction and maintenance. At the same time, the low orbit is associated with the satellite's shorter lifespan, which implies that costs have to be recovered within a shorter time period. Having witnessed financial problems of Iridium or Globalstar, work on the next systems based on satellites in the LEO orbits was terminated. It is considered that without reducing significantly the costs of construction and launching, satellites in the LEO orbits won't be successful. Over the next few years the development of satellite communications will be based on GEO satellites (approximately 10 satellites are expected to be launched annually) characterised by heavier weight and power (using new technologies) allowing for the reduction in size of earth terminals (the possibility of using mobile terminals). In the longer period it is expected that satellite systems based on MEO satellites will be established (much lower costs as compared to the LEO systems and longer lifespan comparable to GEO satellites).

Planning to take up activities in the scope of satellite communications it should be taken into account that over 40 per cent of satellite transponders are currently not used, and consequently prices for their lease are systematically falling.

More detailed information (including economic data) on prospects for the development of satellite communications as well as a description of key satellite communications systems currently in operation can be found in Annex 2.

IV. Assessment of Polish orbital positions and possibilities for their use

Assessment of positions

1. Position 15.2ºE - difficult to use as the nominal position 15,2 E is surrounded by big constellations of Hot Bird satellites owned by Eutelsat and ASTRA satellites covering the territory of Poland and operating in the same frequency band as the one provided for the Polish satellite. Nation-wide coverage obliges the operator to use footprint in the shape of an ellipse with precisely defined dimensions and oriented towards as precise coverage of the national area as possible. This prevents the satellite from being used for the purposes of international communications.

2. Position 50ºE – correct in terms of technical parameters. The elevation angle is more than 20º in the whole of the territory of Poland. The disadvantage of position 50ºE is however that it is to be shared with the countries with unstable economic situation and also political, at least in some of these countries. This means that the possibilities for the launch and operation a single satellite are faint. It should be also stressed that position 50,0º E is distant from positions occupied by the constellation of ASTRA (19,2º E) and Eutelsat (13,0º E) satellites and thus special orientation of receiving antennas towards this satellite would be necessary. National coverage is an additional obstacle from a business point of view. At present it is also not clear what the real possibilities of using this position for the purposes of telecommunications in a broader sense of the word could be (initial allocation – broadcasting). At the present stage of telecommunications convergence the justification for a satellite intended only for broadcasting, within its traditional meaning, is not sufficient. The concept for such allocation was relevant several years ago.

3. The above-mentioned requirements for footprint to cover only a given country refer to a situation in which the countries use their orbital resources independently and for their own purposes. In the case of joint initiatives covering the territory of several neighbouring countries it can be assumed that the above limitation in footprint should not apply.

4. The analysis of global satellite communications market development shows that despite the indicated problems with effective use of orbital resources owned by Poland – a certain level of interest from international business in position 50,0 º E, not fully appreciated until now, can be expected. In addition, a Spanish example of granting – under favourable conditions – the so called national position for the purposes of a pan-European system is often quoted. Remarks on the possible use

5. Position 15.2º E – as the coverage is limited only to the national territory, which prevents the satellite from being used for the purposes of international communications, this position in practice seems impossible to be sold to an external operator (because of too small potential of the market). A possible solution is to make an attempt at placing a national satellite for the purposes of Polish entities, institutions, organisations, etc. (e.g. government

administration, local administration, border guards, fire brigade, police, education system, corporate communications). This system could also serve the purpose of national security or the implementation of a national strategy for the development of broadband communications.

6. Position 50ºE – it seems that this position is commercially much more attractive than the position 15.2º E and there are real chances for its sale or lease to a big satellite operator. As this position is shared with countries in unstable situation, attempts at launching a common satellite should be considered as aimless. However, a scenario in which Polish administration reaches an agreement with those countries and under specified conditions becomes a "host" of this position is worth considering.

7. Polish telecommunications legal framework, including provisions on tenders, is relatively complicated with respect to orbital resources, particularity in combination with ITU formal and technical procedures. Consequently, proposals for particular activities can be formulated only at the next stage.

8. It should be considered as strongly desired that the President of URTiP encourages potentially interested parties (national entities, telecommunications operators, financial consortia) to make proposals in relation to the discussed orbital positions. This will allow for a proper identification of market demands and the initial assessment of budgetary revenues together with other benefits for the country as well as administrative costs. Thanks to the analysis of these proposals it will be possible to draft assumptions to particular activities on the international and national scene (the Telecommunications law provides for options with regard to the proceedings).

9. There is universal agreement as to the fact that:

- Poland should not resign from its active participation in the process of satellite telecommunications development. The implementation of satellite projects implies the transfer and development of advanced technologies and is an important development driver.
- The level of telecommunications services in Poland is unsatisfactory in the light of emerging information society. Those services can be to a large extent provided by means of satellite systems.

Thus, the team is of the opinion that Polish entities (or consortia with Polish entities as participants) should be specifically encouraged to take up this challenge.

10. In addition, the team thinks that in circumstances when proposals for the management of the discussed orbital positions were made by international corporations, it would be worth considering whether these positions should be made available to them, ensuring the benefits for our country, such as financial revenues, technologically advanced investment, the availability of certain services to the public, etc.

(2 December 2004)

Annex

Annex 1 Aspekty prawne zagospodarowania i ocena przydatności polskich zasobów orbitalnych (Legal aspects of Polish orbital resources management and assessment of their usefulness) R. Gajczyk, URTiP Department of Frequency Resources Management, November 2004

Annex 2
Perspektywy rozwoju systemów łączności satelitarnej (Prospects for the development of satellite communications systems), J. Modelski, K. Kurek, IR PW, October 2004

Appendices:
D1 – Wybrane systemy łączności satelitarnej (Selected systems of satellite communications), J. Modelski, K. Kurek, R. Szumny, IR PW, November 2004
D2 – Łączność satelitarna w Telekomunikacji Polskiej (Satellite Communications in Telekomuniakacja Polska), W. Dzierżak, CUS TP SAT, December 2003

Annex 3
White Paper - A new European frontier for an expanding Union - An action plan for implementing the European Space policy, European Commission, November 2003
Strategia działań w Polsce dotyczących przestrzeni kosmicznej w warunkach członkostwa w Unii Europejskiej (Action strategy concerning space in the context of Poland's membership of the European Union), Committee for Space and Satellite Research of the Polish Academy of Science, December 2003